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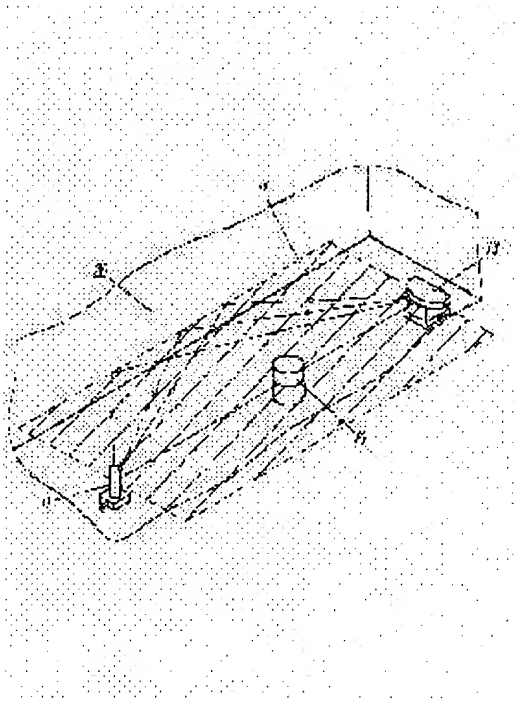
(54) OPTICAL SPACE SIGNAL TRANSMITTER

(57)Abstract:

PURPOSE: To receive a reflected light from a wall efficiently by receiving the light with an optical reception unit whose light collection capability is improved for the light from a planer direction only.

CONSTITUTION: An optical transmission unit 11 has a radiation distribution with a strong radiation intensity in a direction almost along a plane 18 tying the optical transmission unit 11 and an optical reception unit 13 and the optical reception unit 13 has a light collection characteristic with a high light collection efficiency from a direction along the plane 18. Even when an obstacle 19 such as a person or an object shuts the optical transmission unit 11 and the optical reception unit 13, the light radiating in an oblique direction along the plane 18 is reflected in a wall face 20 and received efficiently by the optical reception unit 13 having the high light collection efficiency from the direction along the plane 18 by providing the radiation distribution to the optical transmission unit 11 and the light collection characteristic to the optical reception unit 13 in this way. Thus, the optical space signal transmission is attained even with the obstacle 19.



LEGAL STATUS

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* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] Optical space signal-transmission equipment with which the luminous-radiation reinforcement to the direction which met mostly a certain flat surface containing the straight line which connects an optical transmitting unit and an optical receiving unit consists of a transmitting unit which has strong radiation distribution, and a receiving unit which has the large optical system of the condensing capacity of the light from [above-mentioned] a flat surface.
[Claim 2] Optical space signal-transmission equipment according to claim 1 which consists of an optical transmitting unit which established the optical-axis adjustment means which carries out adjustable [of the optical axis] according to the inclination of a certain flat surface containing the straight line which connects an optical transmitting unit and an optical receiving unit, respectively, and an optical receiving unit.
[Claim 3] The optical space signal-transmission equipment which consists of an optical receiving unit which had two or more light sensing portion articles which made a lens and the optical axis of a photo detector mostly in agreement with the optical transmitting unit which distributed in the direction along a certain flat surface containing the straight line which ties the optical axis of two or more light emitting devices for an optical transmitting unit and an optical receiving unit, and has leaned and arranged in it, distributed in the direction which met the above-mentioned flat surface mostly, and has leaned and arranged the optical axis of two or more above-mentioned light sensing portion articles in it.
[Claim 4] Optical space signal-transmission equipment according to claim 3 which established the lens material and the transparence material block with an almost equal refractive index between two or more lenses of an optical receiving unit, and two or more photo detectors, and carried out adhesion immobilization of a lens, a transparence material block, and a photo detector and a transparence material block.
[Claim 5] The optical space signal-transmission equipment which consists of an optical receiving unit which has arranged as each optical axis is at the above-mentioned flat surface mostly about two or more photo detectors behind two or more lens groups which it approached and compared with the optical transmitting unit which distributed in the direction along a certain flat surface containing the straight line which ties the optical axis of two or more light emitting devices for an optical transmitting unit and an optical receiving unit, and has leaned and arranged in it as an optical axis is in the above-mentioned flat surface mostly.
[Claim 6] Claim 3 which formed the conductive transparence plate between the lens and the photo detector, optical space signal-transmission equipment according to claim 4 or 5.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the optical space signal-transmission equipment used for voice, a video signal, space transmission of data, etc.
[0002]
[Description of the Prior Art] Since it says in recent years that the degree of freedom of a layout increases in connection between audio equipment, a visual equipment, and a data processor, the optical space transmission system is put in practical use partly.
[0003] Conventional optical space signal-transmission equipment is explained below. Drawing 10 and drawing 11 show conventional optical space signal-transmission equipment. According to this drawing, 1 is an optical transmitting unit and the light emitting device 2 is arranged inside. 3 is an optical receiving unit and the photo detector 4 is arranged inside. About the optical space signal-transmission equipment constituted as mentioned above, the actuation is explained below. The electrical signals 5, such as a sound signal, are inputted into the optical transmitting unit 1, and the inputted electrical signal is changed into the signal 6 of the light emitted in space from a light emitting device 2 by the optical transmitting unit. The emitted lightwave signal 6 reaches the photo detector 4 of the optical receiving unit 3, is changed into an electrical signal 7 by the optical receiving unit 3, and is taken out.
[0004] Thus, the signal transmission by light can be performed, without connecting the inside of space for an electric code etc.
[0005]
[Problem(s) to be Solved by the Invention] However, with the above-mentioned conventional configuration, since the light which reaches a photo detector 4 decreased extremely when people and an object 8 interrupted between the optical transmitting unit 1 and the optical receiving units 3, it had the technical problem of a signal transmission becoming impossible.
[0006] This invention solves the above-mentioned technical problem, and even if people and an object interrupt between the optical transmitting unit 1 and the optical receiving units 3, it aims at offering the optical space signal-transmission equipment in which a signal transmission is possible.
[0007]
[Means for Solving the Problem] In order to solve this technical problem, distribute along a certain flat surface in space from an optical transmitting unit, and the optical space signal-transmission equipment of this invention makes light emit, and is considered as the configuration which receives light by the optical receiving unit which heightened condensing capacity only within the light from [above-mentioned] a flat surface.
[0008]
[Function] A signal transmission is made possible, even if it can receive the reflected light from a wall efficiently and people and an object interrupt between an optical transmitting unit and optical receiving units by this configuration.
[0009]
[Example] Drawing 1 and drawing 2 explain one example of the optical space signal-transmission equipment of this invention below.
[0010] In this drawing, the optical transmitting unit in which 11 built the light emitting device 12, and 13 are the optical receiving units which built in the photo detector 14. When it is changed into a lightwave signal 16, and the electrical signal 15 inputted into the optical transmitting unit 11 is emitted from a light emitting device 12, reaches a photo detector 14 and is transformed into an electrical signal 17 by the optical receiving unit 13, it is the same as that of the conventional example that an optical space signal transmission is performed.
[0011] The point that this example differs from the conventional example is that the condensing effectiveness from a direction in which the optical receiving unit 13 met the flat surface 18 has a condensing high property while the intensity of radiation to the direction which met mostly the flat surface 18 at which the optical transmitting unit 11 contains the straight line which connects the optical transmitting unit 11 and the optical receiving unit 13 has strong radiation distribution.
[0012] Also when the obstructions 19, such as people and an object, interrupt between the optical transmitting unit 11 and the optical receiving units 13 like drawing 2 by considering as radiation distribution of the above optical transmitting units 11, and the condensing property of an optical receiving unit, the light emitted in the direction of slant along the flat surface 18 reflects in a wall surface 20, and can receive light efficiently by the optical receiving unit 13 with the condensing high effectiveness from a direction along a flat surface 18. For this reason, also when interrupted by the obstruction 19, an optical space signal transmission becomes possible.
[0013] Although some which receive the reflected light from a wall etc. by making condensing effectiveness from an omnidirection equal mostly were in the receiving unit conventionally, according to this example, the reflected light from a wall etc. can be efficiently transmitted by restricting the direction where condensing effectiveness is high to a flat surface 18.
[0014] In addition, since the rolling mechanisms 25 and 26 for optical-axis adjustment which can change an inclination according to the above-mentioned flat surface 18 are formed in the optical transmitting unit 11 and the optical receiving unit 13 as shown in drawing 2 , even if a difference is in the height of the optical transmitting unit 11 and the optical receiving unit 13 like drawing 3 , a flat surface 18 can be established easily.
[0015] Below, a means to give strong reflective distribution in the direction along a flat surface 18 is explained to the optical transmitting unit 11. First, drawing 4 (a) and (b) explain one example of the configuration of the optical transmitting unit 11.
[0016] According to this drawing, two or more light emitting devices 12 are arranged at the optical transmitting unit 11, and although, as

for the light emitting device 12 of the upper part 21, the optical axis has turned to the direction of a transverse plane, the light emitting device 12 of the upper part 22 leans and arranges the optical axis to the longitudinal direction. It can consider as strong luminous-radiation distribution of optical reinforcement in the direction which met the flat surface 18 by this. In addition, in this example, although light was distributed in the direction along a flat surface 18 by leaning the optical axis of the light emitting device of the upper part 22, a light emitting device 12 can acquire the same effectiveness by forming a reflecting plate 23, without leaning like drawing 5 . Moreover, as shown in drawing 6 (a) and (b), the same effectiveness is acquired also by using the cylinder-side-like concave lens 24.

[0017] Then, a means to give the condensing high property of the condensing effectiveness from a flat surface 18 to the optical receiving unit 13 is explained. Drawing 7 (a) and (b) explain one example of the configuration of an optical receiving unit first. According to this drawing, a lens, and 34-36 are photo detectors, and 31-33 form three light sensing portion article 31a-33a which made lenses 31-33 and the optical axis of photo detectors 34-36 mostly in agreement, respectively. These three light sensing portion articles lean an optical axis along the direction 37 parallel to a flat surface 18, and are attached.

[0018] If this meets in the direction 37 parallel to a flat surface 18, it has a large angle of beam spread, but if met in a flat surface 18 and the right-angled direction 38, an angle of beam spread is narrow and can realize an optical receiving unit with the condensing high effectiveness from a direction in which the flat surface 18 met. In addition, in immobilization with lenses 31-33 and photo detectors 34-36, if adhesion immobilization is carried out through a lens material and transparence adhesives with an almost equal refractive index, the reflection loss of the light in a fixed side can be reduced.

[0019] Drawing 8 (a) and (b) show other examples of an optical receiving unit, and in this drawing, it is a lens, and 41-43 carry out the contiguity unification of the three pieces, and they are fixing them. 44-46 are photo detectors. By considering as such a configuration, as for three photo detectors 44-46, the condensing effectiveness of the light from the direction of 47-48 becomes high with the nearby lenses 41-43, respectively. Like the above-mentioned example of an optical receiving unit, if met in the direction 37 parallel to a flat surface 18, it has a large angle of beam spread, but if met in a flat surface 18 and the right-angled direction 38, an angle of beam spread is narrow and can realize an optical receiving unit with the condensing high effectiveness from a direction in which the flat surface 18 met.

[0020] Furthermore, according to this example, with the lenses 41 and 43 of both ends, the condensing effectiveness from the direction of 50 and 51 also becomes high, and, as for the central photo detector 45, can acquire condensing high capacity, for example. In addition, if the conductive transparence plate 53 is formed and grounded between the lens and the photo detector like drawing 8 , a shielding effect can be given, without spoiling most optical properties. If an antireflection film is further formed in the base material of this conductive transparence plate 53 using the material and the ingredient with an almost equal refractive index of a lens, loss by reflection of light can also be reduced. Moreover, it cannot be overemphasized that it is obtained even if it prepares in optical receiving units other than the above-mentioned example about a shielding effect with the conductive transparence plate 53.

[0021] Drawing 9 (a) and (b) show other examples of an optical receiving unit, and according to this drawing, 61-63 are photo detectors and a lens, and 64-66 are being fixed through the material of the conductive transparence plate 68 and lenses 61-63, and the transparence material block 67 with an almost equal refractive index, respectively. Thereby, like the example of drawing 7 , if met in the direction 37 parallel to a flat surface 18, it has a large angle of beam spread, but if met in a flat surface 18 and the right-angled direction 38, an angle of beam spread is narrow and can realize an optical receiving unit with the condensing high effectiveness from a direction in which the flat surface 18 met. In addition, in this example, since the transparence material block 67 was established, thickness of lenses 61-63 can be made thin, and it becomes possible to use low price lenses, such as a resin molding lens. Moreover, it also becomes easy to give a shielding effect with conductive transparence resin 68.

[0022]

[Effect of the Invention] This invention can receive the reflected light from a wall efficiently, and even if people and an object interrupt between an optical transmitting unit and optical receiving units, it can realize the outstanding optical space signal-transmission equipment in which a signal transmission is possible as mentioned above by distributing along a certain flat surface in space from an optical transmitting unit, making light emit, and considering as the configuration which receives light by the optical receiving unit which heightened condensing capacity only within the light from [above-mentioned] a flat surface.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The explanatory view of the busy condition of optical space signal-transmission equipment 1 example of this invention
[Drawing 2] This side elevation
[Drawing 3] The explanatory view explaining the busy condition of ****
[Drawing 4] (a) The plan of one example of the optical transmitting unit which is this important section
(b) This side elevation
[Drawing 5] The plan of other examples of the optical transmitting unit which is this important section
[Drawing 6] (a) The plan of other examples of the optical transmitting unit which is this important section
(b) This side elevation
[Drawing 7] (a) The plan of one example of the optical receiving unit which is this important section
(b) This side elevation
[Drawing 8] (a) The plan of other examples of the optical receiving unit which is this important section
(b) This side elevation
[Drawing 9] (a) The plan of other examples of the optical receiving unit which is this important section
(b) This side elevation
[Drawing 10] The explanatory view of the busy condition of conventional optical space signal-transmission equipment
[Drawing 11] This block diagram
[Description of Notations]
11 Optical Transmitting Unit
12 Light Emitting Device
13 Optical Receiving Unit
14 Photo Detector
18 Flat Surface
25 26 Rolling mechanism
31, 32, 33 Lens
31a, 32a, 33a Light sensing portion article
34, 35, 36 Photo detector
41, 42, 43 Lens
44, 45, 46 Photo detector
53 Conductive Transparence Plate
61, 62, 63 Lens
64, 65, 66 Photo detector
67 Transparence Material Block
68 Conductive Transparence Plate

[Translation done.]

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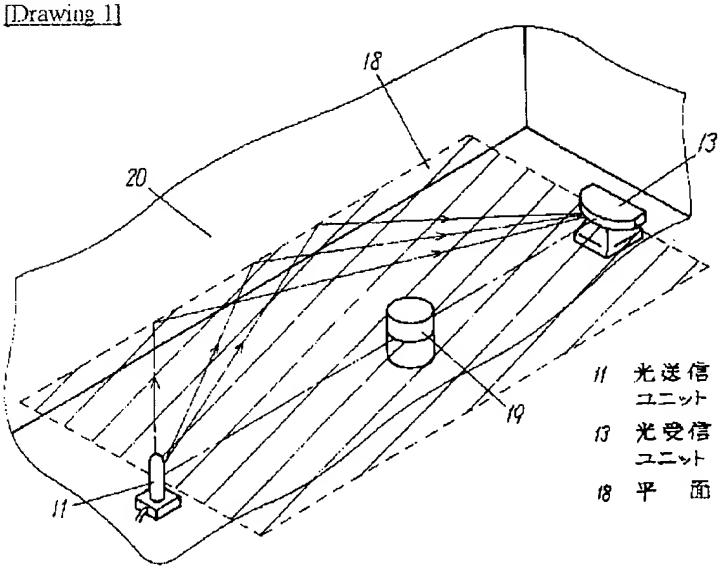
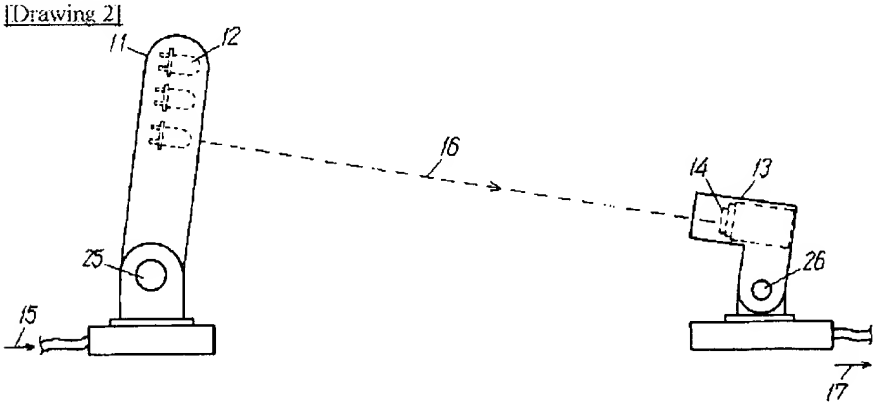
DRAWINGS

[Drawing 1]

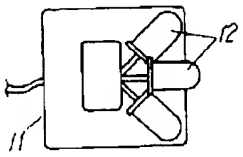


[Drawing 2]

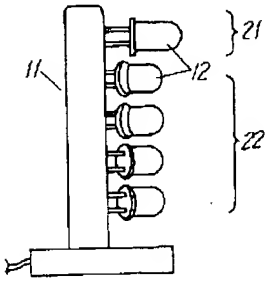


[Drawing 4]

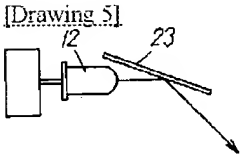
(a)



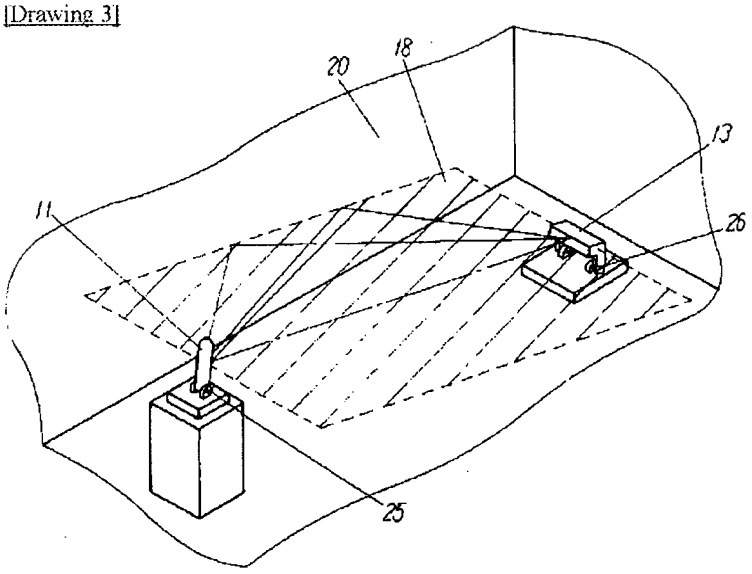
(b)



[Drawing 5]

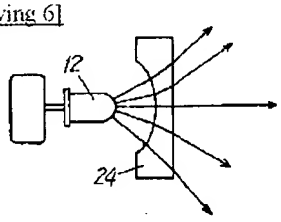


[Drawing 3]

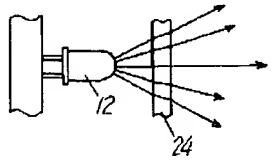


[Drawing 6]

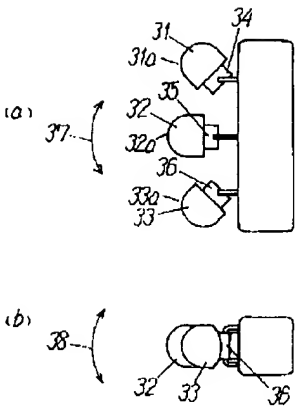
(a)



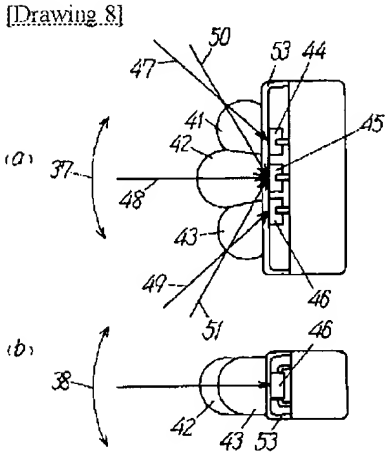
(b)



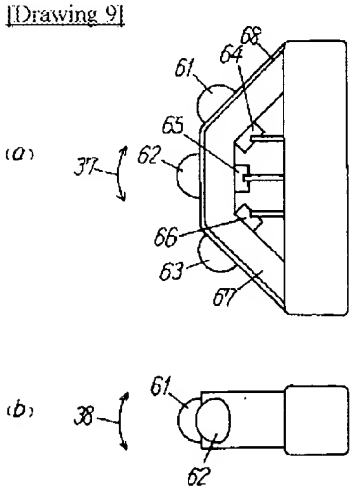
[Drawing 7]



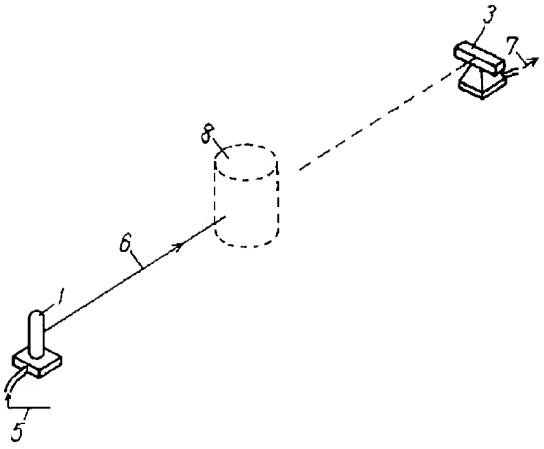
[Drawing 8]



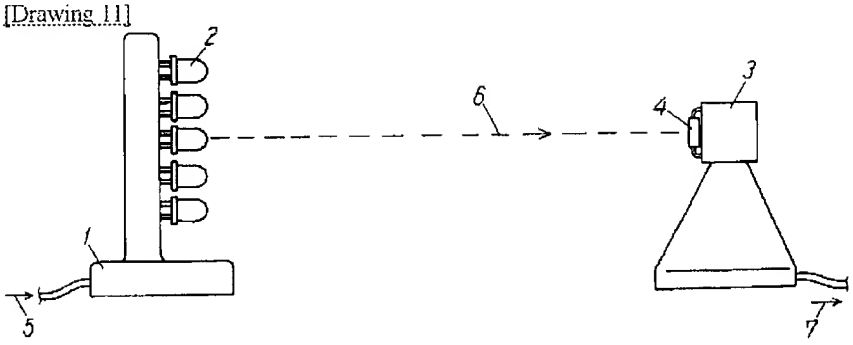
[Drawing 9]



[Drawing 10]



[Drawing 11]



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(54)【発明の名称】　光空間信号伝送装置

(57)【要約】

【目的】　音声、映像信号やデータの空間伝送等に用いられる光空間信号伝送装置に関するものであり、光送信ユニットと光受信ユニットとの間を人や物が遮ると、受光素子に到達する光が極端に減少して信号伝送ができなくなるという課題を解決し、人や物が遮っても信号伝送が可能な光空間信号伝送装置を提供することを目的とするものである。

【構成】　光送信ユニット１１から空間内のある平面１８に沿って分散して光を放出させ、上記平面１８方向からの光に限って集光能力を高めた光受信ユニット１３により受光する構成とすることにより、壁２０からの反射光を効率よく受光し、光送信ユニット１１と光受信ユニット１３との間を人や物が遮っても信号伝送を可能とするものである。

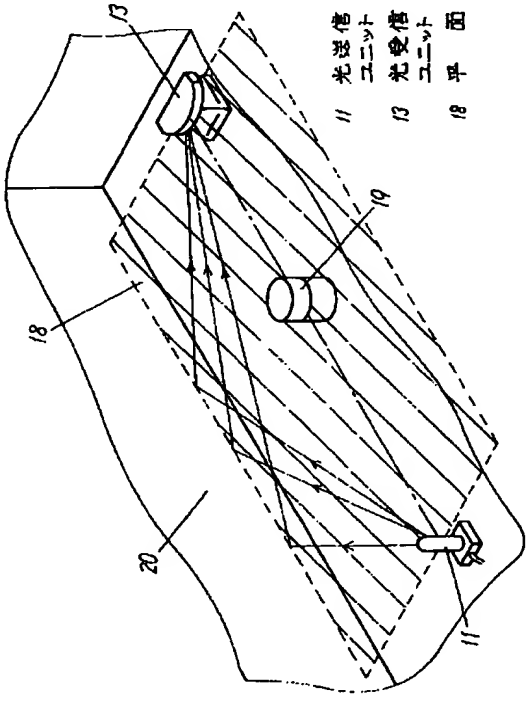

図１８

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【特許請求の範囲】

【請求項1】光送信ユニットと光受信ユニットを結ぶ直線を含むある平面にほぼ沿った方向への光放射強度が強い放射分布を有する送信ユニットと、上記平面方向からの光の集光能力の大きい光学系を有する受信ユニットからなる光空間信号伝送装置。

【請求項2】光送信ユニットと光受信ユニットを結ぶ直線を含むある平面の傾きに合せて光軸を可変する光軸調整手段をそれぞれ設けた光送信ユニットと光受信ユニットからなる請求項1記載の光空間信号伝送装置。

【請求項3】複数個の発光素子の光軸を光送信ユニットと光受信ユニットを結ぶ直線を含むある平面に沿った方向に分散して傾けて配置した光送信ユニットと、レンズと受光素子の光軸をほぼ一致させた受光部品を複数個有し、上記複数個の受光部品の光軸を上記平面にほぼ沿った方向に分散して傾けて配置した光受信ユニットからなる光空間信号伝送装置。

【請求項4】光受信ユニットの複数個のレンズと複数個の受光素子との間に、レンズ素材とほぼ屈折率の等しい透明素材ブロックを設け、レンズと透明素材ブロック及び受光素子と透明素材ブロックとを密着固定した請求項3記載の光空間信号伝送装置。

【請求項5】複数個の発光素子の光軸を光送信ユニットと光受信ユニットを結ぶ直線を含むある平面に沿った方向に分散して傾けて配置した光送信ユニットと、光軸がほぼ上記平面内にあるよう近接して並べた複数個のレンズ群の後方に複数個の受光素子をそれぞれの光軸がほぼ上記平面にあるように配置した光受信ユニットからなる光空間信号伝送装置。

【請求項6】レンズと受光素子の間に、導電性透明板を設けた請求項3、請求項4または請求項5記載の光空間信号伝送装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、音声、映像信号やデータの空間伝送等に用いられる光空間信号伝送装置に関するものである。

【0002】

【従来の技術】近年、オーディオ機器、映像機器およびデータ処理機器間の接続において、レイアウトの自由度が高まるという理由から光空間伝送方式が一部で実用化されている。

【0003】以下に従来の光空間信号伝送装置について説明する。図10及び図11は、従来の光空間信号伝送装置を示すものである。同図によると、1は光送信ユニットであり、内部に発光素子2が配置されている。3は光受信ユニットであり、内部に受光素子4が配置されている。以上のように構成された光空間信号伝送装置について、以下その動作について説明する。光送信ユニット1には、音声信号などの電気信号5が入力され、入力された電気信号は光送信ユニットによって発光素子2から空間内に放出する光の信号6に変換される。放出された光信号6は、光受信ユニット3の受光素子4に到達し、光受信ユニット3により電気信号7に変換されて取り出される。

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【0004】このようにして、空間内を電気コードなどを接続せずに光による信号伝送を行うことができる。

【0005】

【発明が解決しようとする課題】しかしながら上記の従来の構成では、光送信ユニット1と光受信ユニット3との間を人や物8が遮ると、受光素子4に到達する光が極端に減少するので、信号伝送ができなくなるという課題を有していた。

【0006】本発明は上記課題を解決するもので、光送信ユニット1と光受信ユニット3との間を人や物が遮っても信号伝送が可能な光空間信号伝送装置を提供することを目的とするものである。

【0007】

【課題を解決するための手段】この課題を解決するために本発明の光空間信号伝送装置は、光送信ユニットから空間内のある平面に沿って分散して光を放出させ、上記平面方向からの光に限って集光能力を高めた光受信ユニットにより受光する構成としたものである。

【0008】

【作用】この構成によって、壁からの反射光を効率よく受光することができ、光送信ユニットと光受信ユニットとの間を人や物が遮っても信号伝送を可能とするものである。

【0009】

【実施例】以下本発明の光空間信号伝送装置の一実施例について、図1，図2により説明する。

【0010】同図において、11は発光素子12を内蔵した光送信ユニット、13は受光素子14を内蔵した光受信ユニットである。光送信ユニット11に入力された電気信号15が光信号16に変換され発光素子12より放出され、受光素子14に到達して光受信ユニット13により電気信号17に変換されることにより光空間信号伝送が行われることは従来例と同様である。

【0011】本実施例が従来例と異なる点は、光送信ユニット11が、光送信ユニット11と光受信ユニット13を結ぶ直線を含む平面18にほぼ沿った方向への放射強度が強い放射分布を持っていると共に、光受信ユニット13が平面18に沿った方向からの集光効率が高い集光特性をもっていることである。

【0012】上記のような光送信ユニット11の放射分布と光受信ユニットの集光特性とすることにより、図2のように光送信ユニット11と光受信ユニット13の間を人や物などの障害物19が遮った場合も、平面18に沿って斜め方向に放出された光が壁面20に反射し、平面18に沿った方向からの集光効率の高い光受信ユニッ

ト１３により効率よく受光することができる。このため、障害物１９に遮られた場合にも光空間信号伝送が可能となる。

【００１３】従来、受信ユニットにほぼ全方位からの集光効率を等しくすることにより壁などからの反射光を受光するものはあったが、本実施例によれば、平面１８に集光効率の高い方向を限ることにより、壁などからの反射光を効率よく伝送することができる。

【００１４】なお、図2に示すように、光送信ユニット１１及び光受信ユニット１３に上記平面１８に合せて傾きを変更し得る光軸調整用の回転機構２５，２６を設けているので図3のように光送信ユニット１１と光受信ユニット１３の高さに差があっても容易に平面１８を設けることができるものである。

【００１５】つぎに、光送信ユニット１１に平面１８に沿った方向へ強い反射分布を持たせる手段について説明する。まず、図４（ａ），（ｂ）により光送信ユニット１１の構成の一実施例について説明する。

【００１６】同図によると光送信ユニット１１には複数個の発光素子１２が配置されており、上部２１の発光素子１２は光軸が正面方向を向いているが、上部２２の発光素子１２は左右方向に光軸を傾けて配置している。これにより平面１８に沿った方向に光強度の強い光放射分布とすることができる。なお、この実施例においては、上部２２の発光素子の光軸を傾けることにより光を平面１８に沿った方向に分散させたが、図５のように発光素子１２は傾けずに反射板２３を設けることにより同様の効果を得ることができる。また、図６（ａ），（ｂ）のように、円柱面状の凹面レンズ２４を用いることによっても同様の効果が得られる。

【００１７】続いて、光受信ユニット１３に平面１８からの集光効率の高い集光特性を持たせる手段について説明する。まず図７（ａ），（ｂ）により光受信ユニットの構成の一実施例について説明する。同図によると、３１～３３はレンズ、３４～３６は受光素子であり、それぞれレンズ３１～３３と受光素子３４～３６の光軸をほぼ一致させた３個の受光部品３１ａ～３３ａを形成している。これら３個の受光部品は、光軸を平面１８と平行な方向３７に沿って傾けて取りつけられている。

【００１８】これにより、平面１８と平行な方向３７に沿っては広い指向角を持つが、平面１８と直角な方向３８に沿っては指向角が狭く、平面１８の沿った方向からの集光効率の高い光受信ユニットを実現することができる。なお、レンズ３１～３３と受光素子３４～３６との固定において、レンズ素材とほぼ屈折率の等しい透明接着剤を介して密着固定すれば、固定面に於ける光の反射損失を低減することができる。

【００１９】図８（ａ），（ｂ）は、光受信ユニットの他の実施例を示すものであり、同図において、４１～４３はレンズであり、３個を近接一体化して固定している。４４～４６は受光素子である。このような構成とすることにより、３個の受光素子４４から４６はそれぞれ近くのレンズ４１～４３により４７～４８の方向からの光の集光効率が高くなり、光受信ユニットの上記実施例と同様、平面１８と平行な方向３７に沿っては広い指向角を持つが、平面１８と直角な方向３８に沿っては指向角が狭く、平面１８の沿った方向からの集光効率の高い光受信ユニットを実現することができる。

【００２０】さらに、本実施例によれば、たとえば中央の受光素子４５は両端のレンズ４１，４３により、５０及び５１の方向からの集光効率も高くなり、高い集光能力を得られることになる。なお、図8のようにレンズと受光素子の間に導電性透明板５３を設け接地しておけば、光学的な特性をほとんど損なうことなくシールド効果を持たせることができる。この導電性透明板５３の基材にはレンズの素材とほぼ屈折率の等しい材料を用い、さらに反射防止膜を形成すれば光の反射による損失も低減することができる。また、導電性透明板５３によるシールド効果については、上記実施例以外の光受信ユニットにおいて設けても得られることは言うまでもない。

【００２１】図９（ａ），（ｂ）もまた光受信ユニットの他の実施例を示すものであり、同図によると６１～６３はレンズ、６４～６６は受光素子であり、それぞれ、導電性透明板６８およびレンズ６１～６３の素材とほぼ屈折率の等しい透明素材ブロック６７を介して固定されている。これにより、図７の実施例と同様に、平面１８と平行な方向３７に沿っては広い指向角を持つが、平面１８と直角な方向３８に沿っては指向角が狭く、平面１８の沿った方向からの集光効率の高い光受信ユニットを実現することができる。なお、本実施例では、透明素材ブロック６７を設けたので、レンズ６１～６３の厚さを薄くすることができ、樹脂成型レンズなど低価格なレンズを使用する事が可能となる。また、導電性透明樹脂６８によりシールド効果を持たせることも容易となるものである。

【００２２】

【発明の効果】以上のように本発明は、光送信ユニットから空間内のある平面に沿って分散して光を放出させ、上記平面方向からの光に限って集光能力を高めた光受信ユニットにより受光する構成とすることにより、壁からの反射光を効率よく受光することができ、光送信ユニットと光受信ユニットとの間を人や物が遮っても信号伝送が可能な優れた光空間信号伝送装置を実現できるものである。

【図面の簡単な説明】

【図１】本発明の光空間信号伝送装置一実施例の使用状態の説明図

【図２】同側面図

【図３】同他の使用状態を説明する説明図

【図４】（ａ）同要部である光送信ユニットの一実施例

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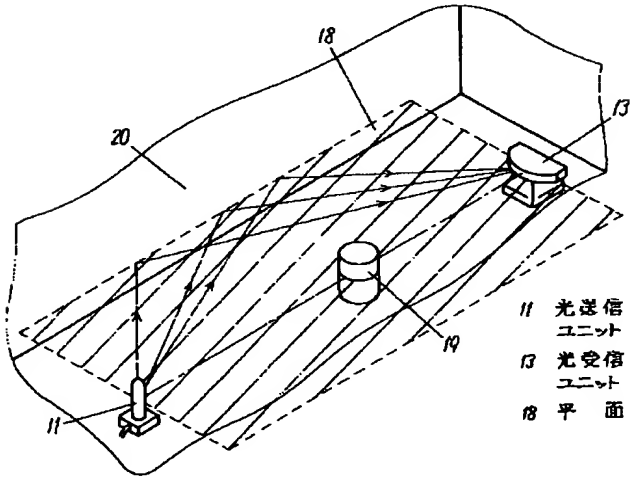
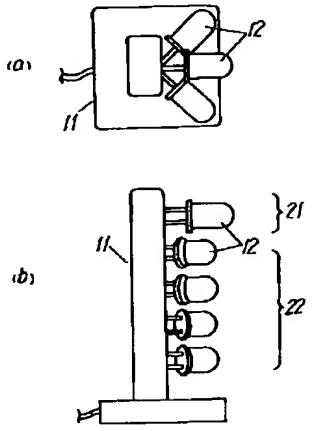
の上面図
（ｂ）同側面図
【図５】同要部である光送信ユニットの他の実施例の上面図
【図６】（ａ）同要部である光送信ユニットの他の実施例の上面図
（ｂ）同側面図
【図７】（ａ）同要部である光受信ユニットの一実施例の上面図
（ｂ）同側面図
【図８】（ａ）同要部である光受信ユニットの他の実施例の上面図
（ｂ）同側面図
【図９】（ａ）同要部である光受信ユニットの他の実施例の上面図
（ｂ）同側面図
【図１０】従来の光空間信号伝送装置の使用状態の説明図
【図１１】同構成図
【符号の説明】
１１　光送信ユニット
１２　発光素子
１３　光受信ユニット
１４　受光素子
１８　平面
２５，２６　回転機構
３１，３２，３３　レンズ
３１ａ，３２ａ，３３ａ　受光部品
３４，３５，３６　受光素子
４１，４２，４３　レンズ
４４，４５，４６　受光素子
５３　導電性透明板
６１，６２，６３　レンズ
６４，６５，６６　受光素子
６７　透明素材ブロック
６８　導電性透明板

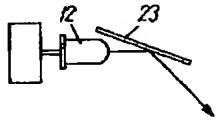
【図１】



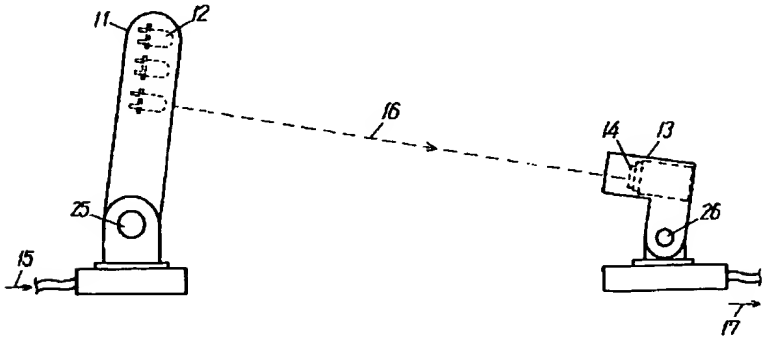
【図４】



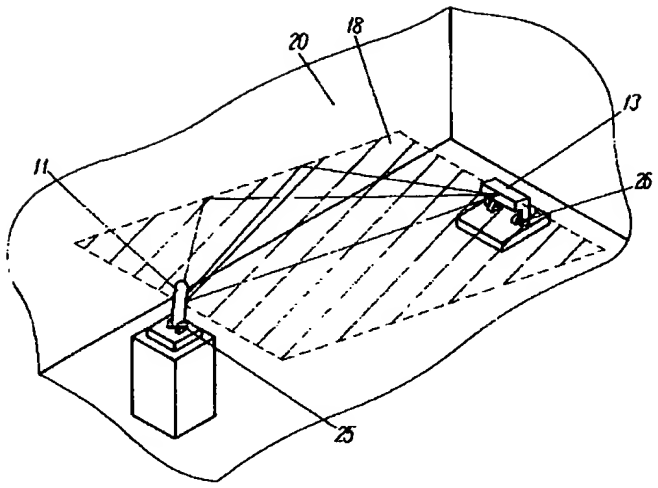
【図５】



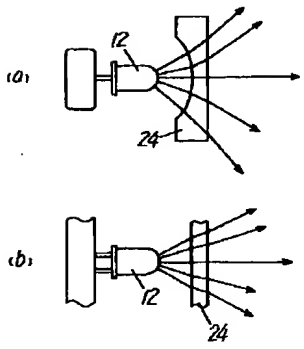
【図２】



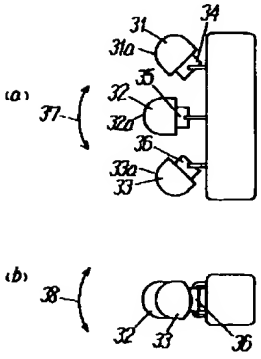
【図3】



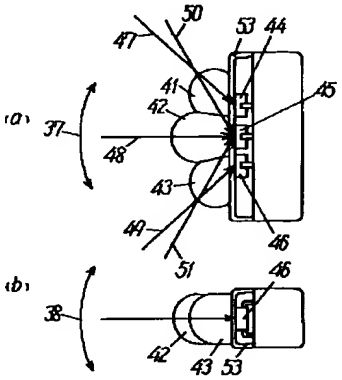
【図6】



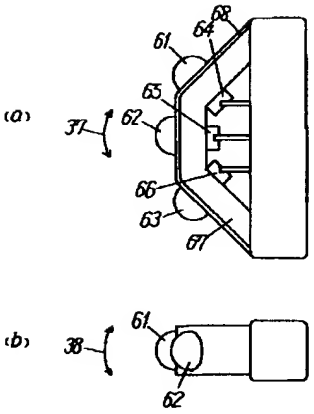
【図7】



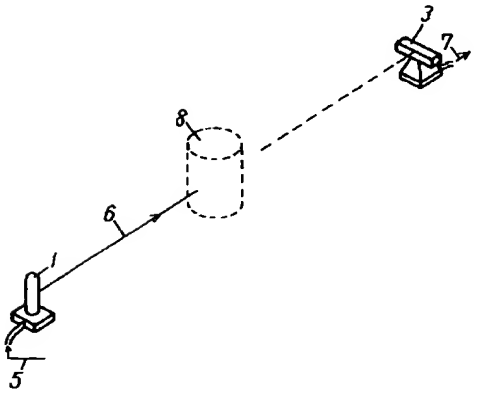
【図8】



【図9】



【図10】



【図11】